Documenting The Rapidly Changing Biodiversity Of The Los Angeles Area Through Citizen Science

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A male Western fence lizard *(Sceloporus occidentalis)*. Photo: Bob Worrell

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The biota of the Los Angeles River Watershed is changing rapidly. In the past century, the human population within this region has grown dramatically, causing habitat loss and fragmentation *(Table 1)*. The resulting decline of native species has been accompanied and exacerbated by introductions of nonnative species. The region is home to the 6th busiest airport in the world and the busiest container port in the nation. With so many goods and people moving into and through the region, nonnative species are almost certainly introduced on a daily basis.

Unfortunately, researchers' ability to study the rapidly changing distributions of native and nonnative species is limited because of declines in natural history research and funding. The standard method for assessing biodiversity is to tally occurrence records from museum databases. However, fewer and fewer specimens are being deposited in natural history collections. Thus, biodiversity assessments that rely on recent records (e.g., tracking responses to urbanization) are data limited *(Table 1)*. Records are even rarer for urbanized areas (e.g., the lower Los Angeles River Watershed) because much of the region is private property that biologists cannot easily survey.

Can citizen science fill this gap in our biodiversity knowledge? Citizen science crowdsources data collection by asking the public to photograph organisms they encounter and submit those photos to online databases. I have implemented this approach through the Reptiles and Amphibians of Southern California (RASCals) citizen science project *(www.inaturalist.org/projects/RASCals)*. Citizen science has dramatically increased the number of reptile and amphibian occurrence records for Los Angeles County. For example, in the 30 year period 1980–2009, only 5.1 specimen records/month were catalogued in natural history collections, while 78.5 records/month have been submitted to the RASCals project during its first 18 months of operation *(Table 1)*.

Not only has citizen science dramatically increased local biodiversity data, it has also resulted in important discoveries, many of which have been published with citizen scientist coauthors. In the past few years, citizen scientist observations submitted to RASCals or similar programs have led to the documentation of the first records of Mediterranean House Geckos in Los Angeles, Orange, and Ventura Counties, the first Indo-Pacific Geckos in Los Angeles and Orange Counties, the first Coqui Frogs in Los Angeles and San Diego Counties, and the first Brahminy Blindsnakes in Los Angeles, Orange, and San Diego Counties. All are established populations of nonnative species that represent the first state and/or county records. Most are also from private property that biologists would have been unlikely to survey; for example, the geckos are mostly found around porch lights of homes and businesses.

The biota of Los Angeles is changing rapidly. As the human population of the region and the extent of urbanization continue to expand, so too does our need for up-to-date biodiversity data to inform conservation and management decisions. Citizen science can, and is, meeting this need.

Decade	No. Specimens	Pop. at decade close (millions)
1900s	528	0.504
1910s	2445	0.936
1920s	377	2.208
1930s	2034	2.785
1940s	2508	4.151
1950s	5760	6.038
1960s	4137	7.041
1970s	5201	7.477
1980s	836	8.863
1990s	719	9.519
2000s	275	9.818
RASCals (18 months)	**1413**	-

Table 1. Number of museum specimens catalogued per decade (1900–2009; based on searches of VertNet) and RASCals citizen science observations (Jun 2013–Nov 2014) for Los Angeles County.

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CITIZEN SCIENCE

Citizen science can be defined as public participation in scientific work under the direction of professional scientists and scientific institutions. Participants can submit photographs, sound recordings, or visual sightings of plants, animals, physical and chemical disturbances such as trash and illicit discharges as observations via websites or mobile applications.

iNaturalist is a project of the California Academy of Sciences that links ordinary citizens and naturalists with biologists to map and share biological observations from around the world. Founded in 2008, iNaturalist celebrated its one millionth observation in 2014.

www.inaturalist.org

RASCals, the Reptiles and Amphibians of Southern California, is a project of the Natural History Museum of Los Angeles County in partnership with the San Diego Natural History Museum. RASCals seeks to improve our knowledge of native and non-native reptiles and amphibians in Southern California in all habitat types, from relatively pristine habitats to heavily modified, urban habitats, such as backyards, schoolyards, and urban parks.

www.inaturalist.org/projects/rascals

Ebird, a project of Cornell Lab of Ornithology and National Audubon Society, documents the presence/absence and abundance of bird species, through checklist data. A simple and intuitive web-interface engages participants who submit their observations or view results via interactive queries into the eBird database. Regional bird experts review all submissions before they enter the database.

ebird.org/content/ebird/